

**400 SERIES
and
500 SERIES
BOILERS**

**FV-40 BURNER
SECTION**

Installation Instructions

Service and Parts Manual

TABLE OF CONTENTS

	Page
I. Preliminary Information.....	3
II. Preparation of Boiler	
Removal & Installation of Burner Assembly.....	4
Breeching, Stack and Draft Controls.....	5
III. General Instructions	
Fuel Connection and Sizes.....	5
Gas Train Controls.....	5
IV. Gas Fuel Systems	
Sizing Gas Header from Meter to Burner.....	8
Gas Line Feeder Sizes.....	9
V. Oil Fuel Systems	
Suggested Fuel Oil Arrangement.....	10
Light Oil.....	10
Fuel Oil Tank.....	11
Suggested Procedure for Installing Fuel Oil Tanks.....	11
VI. Boiler Room Ventilation.....	11
VII. Service, Maintenance and Starting Instructions for Burner.....	12
Oil Nozzle.....	12
Lubrication Procedure and requirements for Motors.....	13
Starting Instructions.....	15
VIII. Parts List and Reference Drawings	
FV-40 Oil Fired Burner.....	22
FV-40 Oil Fired Full Modulation Burner.....	23
FV-40 Gas-Oil Burner.....	24
FV-40 Gas Burner.....	25
Nozzle Pipe Assembly (157304).....	26
Nozzle Pipe Assembly (159380).....	27
Ignitor Pipe Assembly (157312).....	28
Ignitor Pipe Assembly (157345).....	29
Pump Set Assembly Light Oil FV-40 (162449).....	30
Motor & Blower Arrangement FV-40 Belt Drive (159568).....	31

I. PRELIMINARY INFORMATION

The most important single point in the successful operation of a DONLEE Technologies Burner is proper installation. Please read these instructions carefully before starting the installation. For special components and arrangements, refer to factory. Failure to follow these instructions and precautions could result in voiding the DONLEE Technologies warranty on this product.

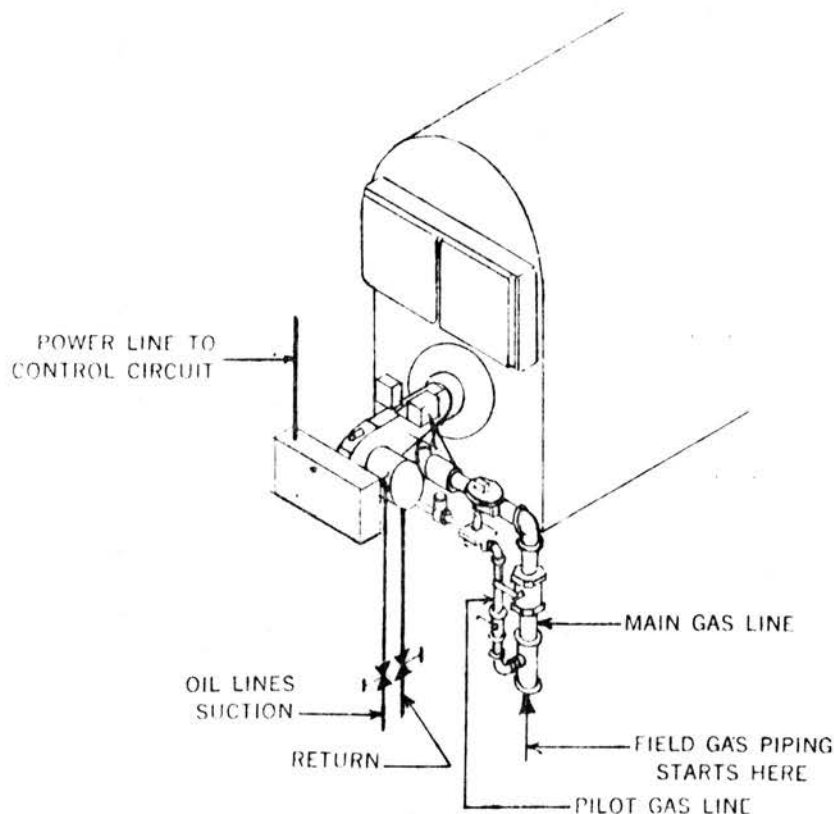
PROTECTION OF EQUIPMENT BEFORE AND DURING INSTALLATION

If the unit is exposed to the elements, dust, cement, mortar and so forth, it should be covered with a tarpaulin or protected in any manner that will prevent damage to the burner, controls and other components. If there is a possibility of flooding the boiler room, it is suggested that the necessary steps be taken to install cellar drainage or sump pumps.

CHECK ALL COMPONENTS IMMEDIATELY UPON ARRIVAL

1. If unit is damaged, make claim to the carrier.
2. Check specifications of electrical service to make sure that they correspond with the electrical characteristics stamped on the unit.
3. Check total ampere rating of the motors, control system, to make sure that the electrical service is adequate.
4. Check the unit controls for type and pressure to make sure that they correspond to the system.
5. Investigate the gas pressure required for maximum capacity of unit on gas or gas/oil burners.

The burner will arrive complete ready to connect to fuel and electrical service.



REMOVAL & INSTALLATION OF BURNER ASSEMBLY

The entire burner can be removed as a unit as follows:

1. Turn off all power & fuel supply lines.
2. Remove and tag any wiring which would restrict the removal of the burner.
3. Disconnect all fuel lines (unions and/or flare fittings).
4. Remove the nuts holding the burner mounting plate to boiler.
5. Place a rope sling around the neck of the blower to support and balance the unit during removal. The sling should be attached to a suitable hoist or lift truck.
6. Be careful to remove the burner unit from the boiler in a straight line to prevent damage to the refractory.
7. Replace all gaskets before replacing the burner unit. Insert in a straight line to prevent refractory damage.
8. Coat all studs with grease or anti-seize lubricant.
9. Tighten the nuts evenly to assure proper alignment and a tight seal.
10. Replace power and fuel lines.

BREECHING, STACK AND DRAFT CONTROLS

FV Series burners are designed for forced draft operation, with the burner blower providing all the air necessary for proper combustion. A simple vent to the atmosphere, run as directly as possible (in compliance with local requirements) is satisfactory. DONLEE strongly recommends use of round breechings (to avoid excessive noise and vibration) with gaskets and flanged joints.

Multiple boiler installations may be connected to a common breeching and/or stack, but other appliances should be connected to separate breeching and stacks. All directional changes should use wide sweeps, and connections from each boiler should enter the main breeching with a wide sweep elbow or 45° connection in the direction of gas flow.

The following chart suggests minimum breeching and stack sizes for various boiler sizes. Variations may be necessary to suit specific conditions.

Boiler Horsepower	Vent/Breeching and Stack Sizes for Number of Boilers (diameter in inches)			
	1	2	3	4
100 Thru 150	12	18	22	26

Burners can be installed and fired with satisfactory results on natural draft boilers. When high stacks or other conditions on such installations result in a draft condition at the boiler in excess of 0.3" W.C. Negative, dampers and sequence draft controls are usually recommended.

FUEL CONNECTIONS AND SIZES REQUIRED FOR STANDARD BURNERS

OIL:

Pipe size at fuel pump (#2, oil) -
Supply - 1/4" Pipe
Return - 1/4" Pipe

GAS TRAIN CONTROLS

All standard U/L gas trains for main flame include an upstream shut-off cock, and electric gas valve, a downstream shut-off cock with test connection, and a gas volume control (butterfly) valve. A gas pressure regulator is not included.

For firing rates above 2,500 MBh, the gas train also includes high and low gas pressure switches and the electric valve is a proof of closure motorized valve.

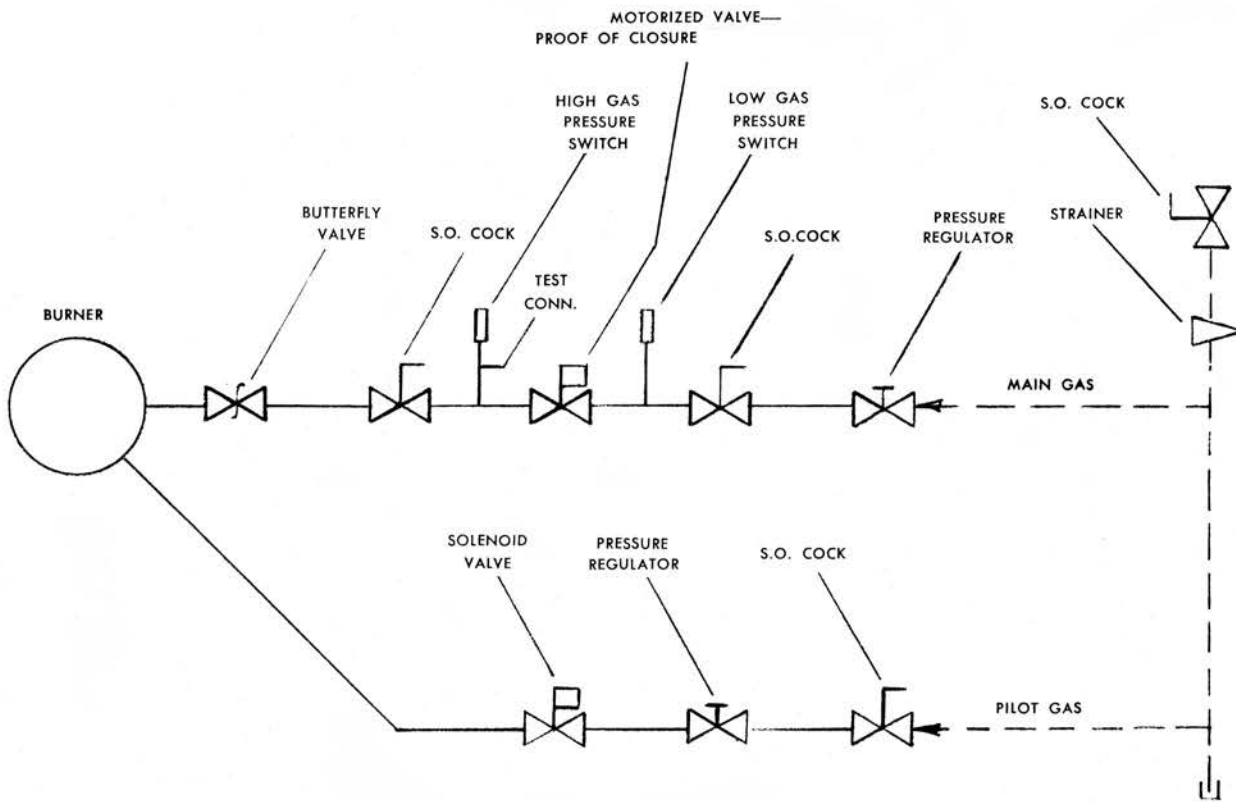
For firing rates above 5,000 MBh, a second motorized gas valve is included.

Components vary, as necessary for FM or IRI (FIA) insurance requirement, and pipe sizes vary with burner size and with available gas pressures.

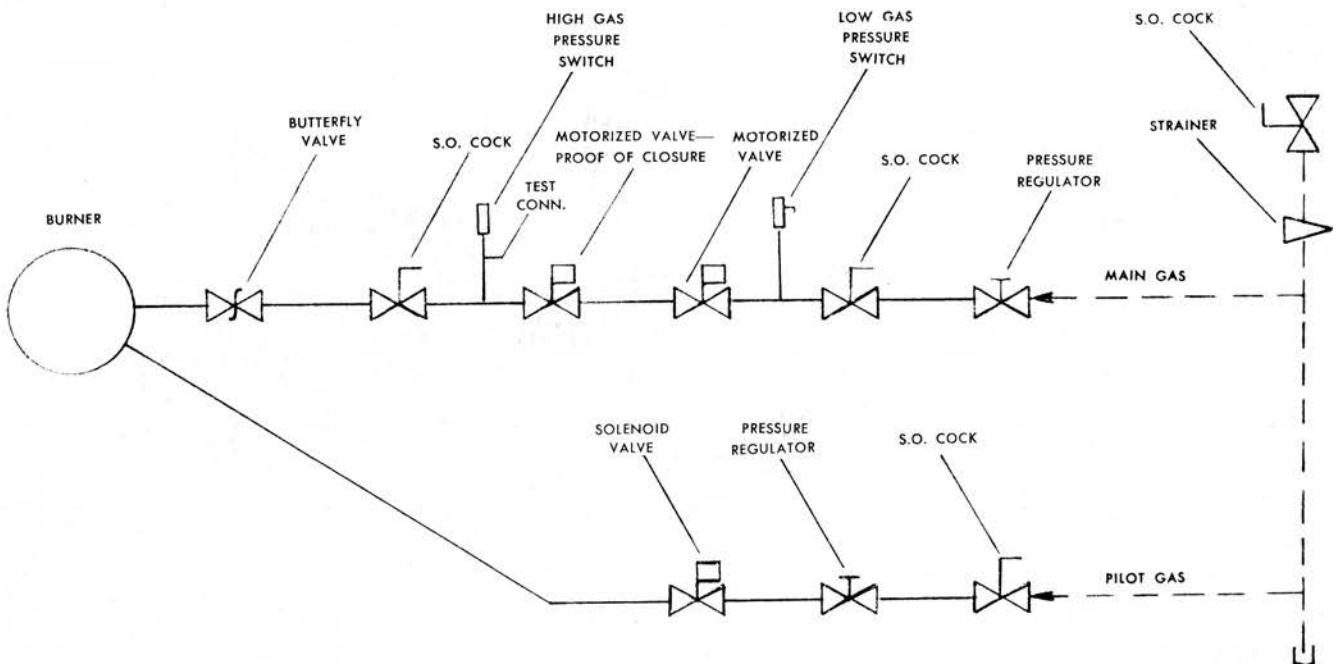
The following schematic drawings show component arrangements for U/L, FM & IRI (FIA). Pressure requirements, main pressure regulator selection, and variations in pipe size are detailed in price sheets and DONLEE's "GAS FUEL MANUAL".

All gas burners are assumed to fire natural gas, 1000 btu/cu. ft., 0.6 specific gravity. For other fuels, consult the factory.

SUGGESTED GAS PIPING

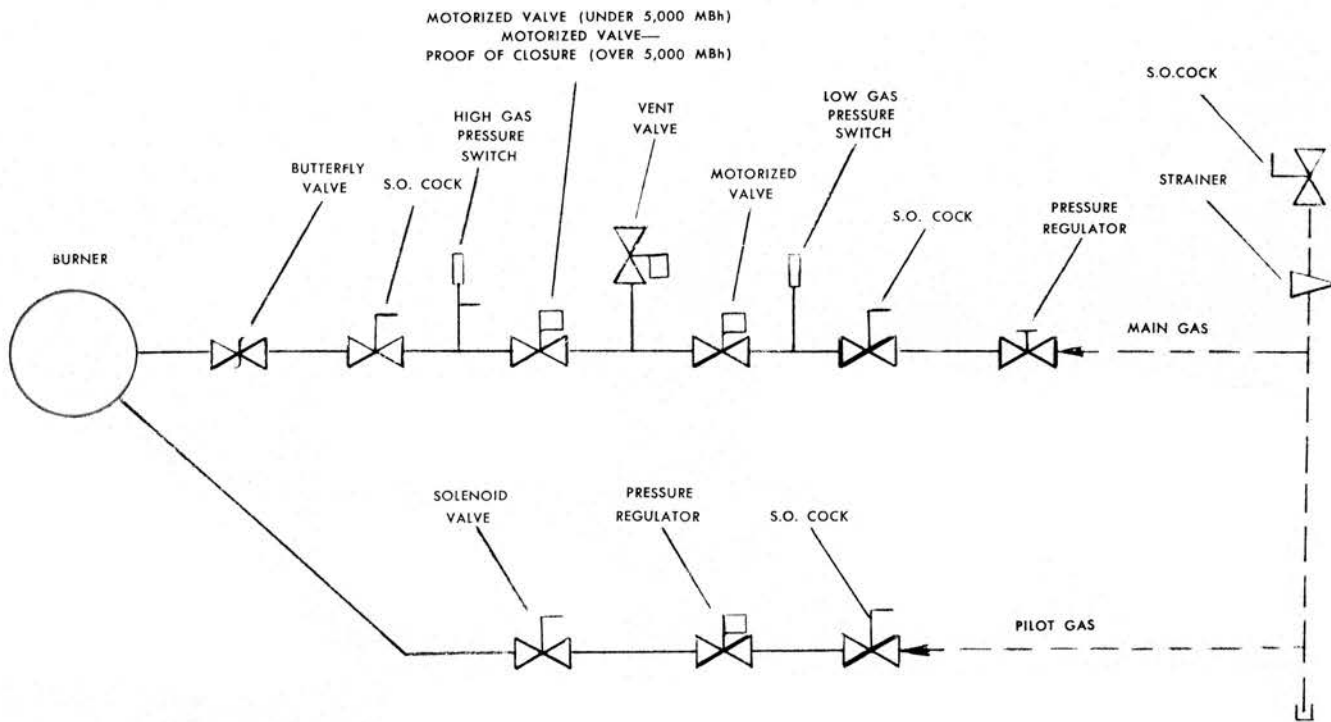


FV40 BURNERS—U/L & FM (under 5,000 MBh)



FV40 BURNERS—U/L & FM (over 5,000 MBh)

SUGGESTED GAS PIPING



FV40—FIA

IV. GAS FUEL SYSTEMS

SIZING GAS HEADER FROM METER TO BURNER

Sizing the gas line from the utility service at the meter to the gas pressure regulator at the burner can be important in cases where the gas pressure available limits the pressure drop to a low value.†

The following sizing method will prove helpful in sizing this line for single or multiple burner installations.

Step #1. Determine the gas flow rate (CFH) by adding the CFH inputs of all units being supplied by the header line. (Note factor for gas with BTU/cu. ft. other than 1000.)

Step #2. Determine the highest pressure required at any one unit being supplied by the header line (note pressure requirements will change if FIA or FM controls are desired and also if BTU/cu. ft. is less than 1000, note factor).

Step #3. Determine the gas pressure required at the entrance of the unit gas regulator by adding 2" W.C.† to the pressure found in Step #2.

Step #4. Determine available pressure drop through the header to supply the quantity of gas by subtracting pressure found in Step #3 from the gas pressure available at the utility meter. (This information will be supplied by the utility.)

Step #5. Determine the estimated equivalent length of header piping to the most distant unit by adding 25% to the actual length of straight pipe involved to allow for all fittings and valves in the line.

Step #6. Divide (Step #5) answer by 100.

Step #7. Calculate the pressure drop available in the header per 100 ft. of pipe by dividing (Step #4) by (Step #6).

Step #8. Refer to (Fig. 1). Locate the gas flow rate (Step #1) on the left side of the chart and draw a horizontal line to the right. Locate the available pressure drop per 100 ft. (Step #7) along the bottom of the chart and draw a line vertically upward. The location of the intersection of the lines will determine the pipe size of the header line (where the intersection falls between pipe sizes use the larger size).

Step #9. Step #5 may now be repeated using from (Fig. II) the actual straight pipe equivalent for the pipe size fittings as determined in (Step #8) in place of the 25% estimate. Steps #6, 7, 8, 9 can then be repeated to check the original estimated condition.

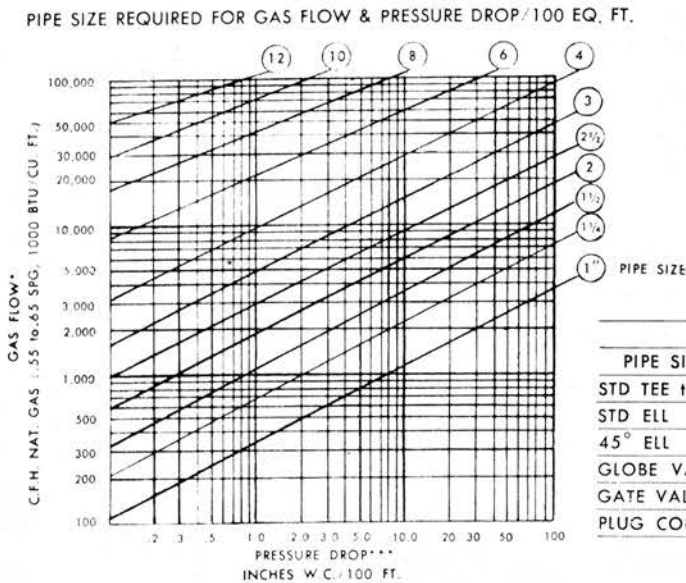


Figure I

EQUIVALENT LENGTH FOR FITTINGS IN FEET											
PIPE SIZE (IPS)	1	1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12
STD TEE thru. SIDE	5.5	7.5	9.0	12.0	14.0	17.0	22.0	33.0	43.0	55.0	65.0
STD ELL	2.7	3.7	4.3	5.5	6.5	8.0	12.0	16.0	20.0	26.0	31.0
45° ELL	1.2	1.6	2.0	2.5	3.0	3.7	5.0	7.5	10.0	12.0	15.0
GLOBE VALVE	27.0	40.0	43.0	45.0	65.0	82.0	120.0	170.0	240.0	290.0	340.0
GATE VALVE	0.6	0.8	0.9	1.2	1.4	1.6	2.2	3.5	4.5	5.5	7.0
PLUG COCK	3.0	4.0	5.5	7.5	9.0	12.0	16.0	27.0	39.0	51.0	65.0

Figure II

† Where ample gas pressure is available it may not be desired to use all the pressure drop available in sizing the header arrangement. A larger pressure drop than 2" W.C. can then be allowed across the unit pressure regulator allowing the use of a smaller regulator.

GAS LINE FEEDER SIZES

The size of the piping from the gas header piping to each unit gas regulator in a multiple unit installation should be sized using the max. gas flow for the individual unit and the pressure drop per 100 ft. found in (Step #7)—in no case should the pipe size be smaller than the unit gas pressure regulator pipe size—see gas pressure regulator requirements.

Sample Problem

What size gas header should be run to handle two 50 HP hot water boilers and a single 80 HP high pressure steam boiler? The boilers are to be furnished to meet UL requirements. The gas is natural, .6 SPG and 1000 BTU/cu. ft.

Step #1. Determine the maximum gas flow rate of all units; $2 \times 2095 + 3350 = 7540$ C.F.H.

Step #2. Determine that the highest pressure required at any one unit for UL requirements is 7.5" W.C.

Step #3. The gas pressure required at the unit pressure regulator is then $7.5'' \text{ W.C.} + 2'' \text{ W.C.} = 9.5'' \text{ W.C.}$

Step #4. The gas company indicates that gas pressure of up to 1 psi will be available after their meter. The available pressure drop to push the quantity of gas through the header is then $1 \text{ psi} = 27.8'' - 9.5'' \text{ W.C.}$ (Step #3) = $18.3'' \text{ W.C.}$

Step #5. From the plans it is determined that the length of straight pipe in the header to the most distant boiler is 200 ft. The allowance for fittings etc. would then be $200 \text{ ft.} \times .25\% = 50 \text{ ft.}$ or a total length straight pipe distance of $200 \text{ ft.} + 50 \text{ ft.} = 250 \text{ ft.}$

Step #6. Divide 250 ft. (Step #5) by 100 = 2.5.

Step #7. The pressure drop available in the header per 100 ft. of pipe is then $18.3'' \text{ W.C.}$ (Step #4) divided by 2.5 (Step #6) = $7.3'' \text{ W.C./100 ft.}$

Step #8. Referring to (Fig. 1) and locating the intersection of 7540 CFH (Step #1) and $7.3'' \text{ W.C./100 ft.}$ (Step #7) we find that a $2\frac{1}{2}''$ IPS pipe might be satisfactory.

Step #9. Now that a good estimate of the pipe size required has been made, go back to Step #5. It has been established that the header will contain 2 tees, 3 standard ells and a gate valve. For $2\frac{1}{2}''$ pipe (Step #8) the equivalent length of these is $(2 \times 14) + (3 \times 6.5) + 1.4 = 48.9 \text{ ft.}$

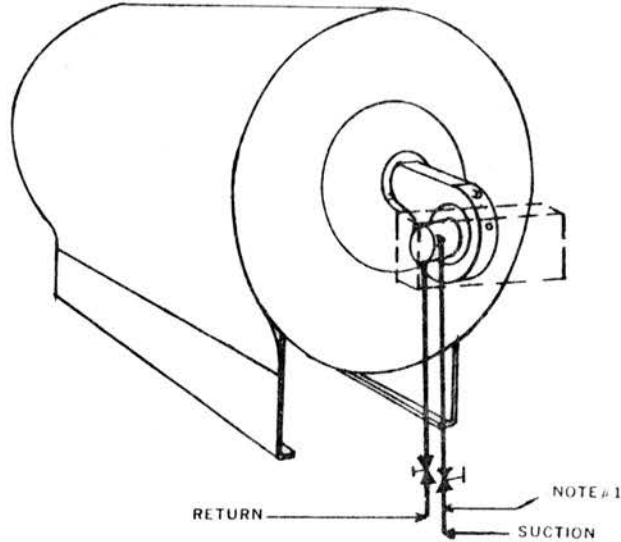
Step 5A. The new equivalent length of pipe is $200 + 48.9 = 248.9 \text{ ft.}$

Step 6A. Divide 248.9 ft. (Step #5A) by 100 = 2.489 ft.

Step 7A. The new pressure drop available in the header per 100 ft. of pipe is now $18.3'' \text{ W.C.}$ (Step #4) divided by 2.489 (Step #6A) = $7.32'' \text{ W.C./100 ft.}$

Step 8A. Referring to (Fig. 1) and locating the intersection of 7540 CFH (Step #1) and $7.32'' \text{ W.C./100 ft.}$ (Step #7A) we find that a $2\frac{1}{2}''$ IPS pipe is the actual requirement.

SUGGESTED FUEL OIL PIPING ARRANGEMENT



NOTE #1—FOR SUCTION AND RETURN LINE SIZE AND ALLOWABLE LENGTH OF RUN SEE "LIGHT OIL" LINE SIZING INFORMATION.

LIGHT OIL

40 SSU MAX. @ 100° F—.85 SPG

Maximum allowable run and suction return line sizing for #2 Oil Burning Units.

LINE SIZING

For all light oil burners, use individual lines of 1/2" O.D. tubing or 1/2" pipe for both suction and return lines.

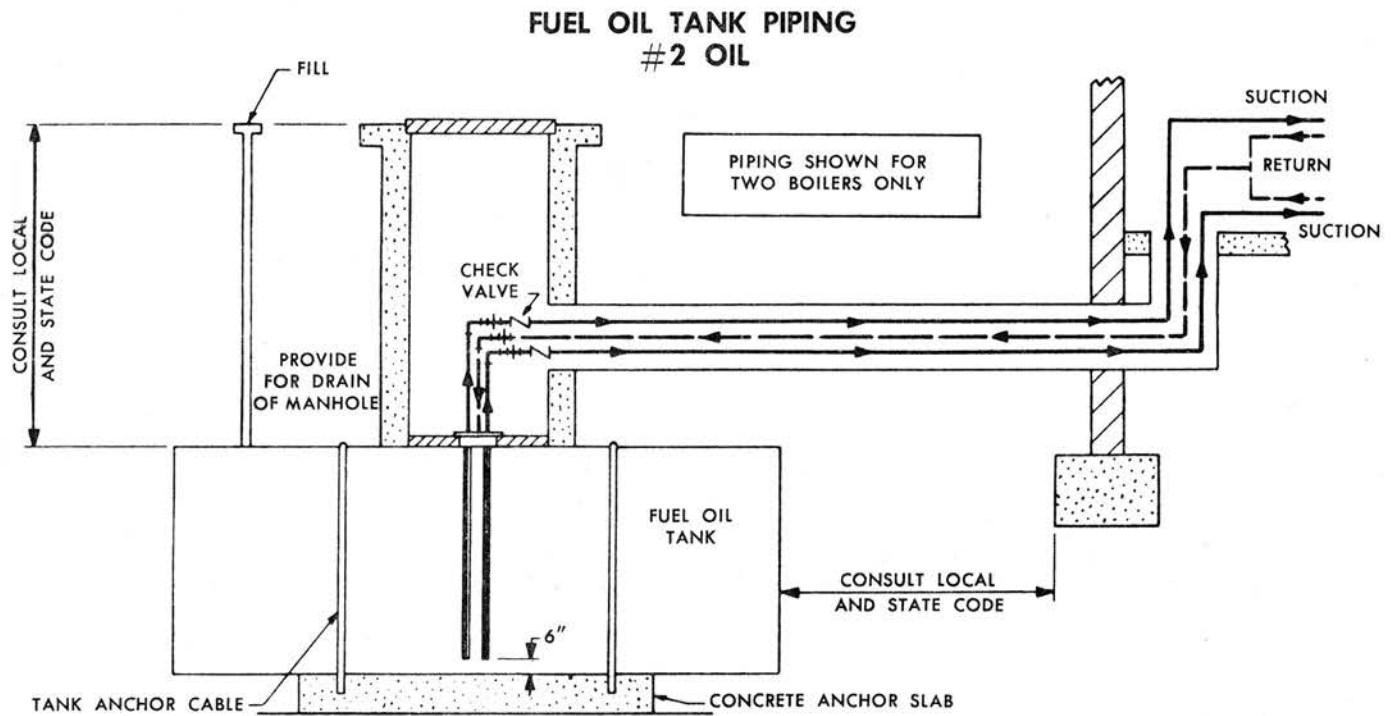
MAXIMUM ALLOWABLE PIPE RUN

To determine the maximum allowable pipe or tubing run from the pump suction connection to the bottom of the fuel oil tank for various lifts and for all size units use the chart below.

TOTAL LIFT (FT.)*	ALLOWABLE RUN (FT.)**
0	91
1	87
2	84
3	81
4	77
5	74
6	70
7	67
8	63
9	60
10	58
11	53
12	50
13	46
14	43
15	39

* To determine "Total Lift" for all units add 8 ft. to the vertical distance from the boiler room floor to the bottom of the fuel oil tank.

** If the actual run exceeds the maximum allowable run, an auxiliary pump set must be used.



FUEL OIL TANK

The fuel oil tank should be located as per local and State Regulations. Proper size depends on the number of gallons consumed per hour, and the availability of delivery. When possible, the tank should be buried beneath the ground. If it is not possible, it should be well protected by masonry construction. Sufficient tapings should be furnished to accommodate a large fill line, remote oil gauge, vent line, suction line and return line.

SUGGESTED PROCEDURE FOR INSTALLING FUEL OIL TANKS

- 1 Test suction and return lines by sealing off tank and boiler piping and subjecting closed system to 125 lbs. inert gas pressure. Remove source of gas. Allow system to remain full for a period of no less than 8 hrs. Pressure gauge should be installed in closed system before subjecting to pressure. If pressure remains at 125 PSI for test period it is assumed system is tight.
2. **POSITIVELY DO NOT** use cast iron fittings in fuel oil piping. Check all pipe threads for over cutting.
3. Run outside lines well below frost line.
4. Protect outside lines below driveways with reinforced concrete slab. Be careful with heavy machinery used during construction and in vicinity of pipe runs.
5. Install tank vent high enough to eliminate source of objectionable odors. Terminate tank vent within sight of tank fill. Use full sized tank fill pipe.
6. Use as few elbows and other fittings as possible—straight run preferable.
7. Pitch lines up from tank to burner or remote pump set.
8. Run suction and return lines full sized, to within 2-feet of burner pump connection.
9. To size lines and locate pump set see "Fuel Pump Location and Suction and Return Line Sizing" information.

VI. BOILER ROOM VENTILATION

Each boiler requires sufficient fresh air to assist the combustion process. Insufficient air will result in smoky fires and large deposits of soot and carbon inside the boiler which will lower the boiler operating efficiency. There are times when incoming air is not desirable. These will be periods of normal shutdown of the equipment. When the boilers are shut off the air supply damper automatically positions the fresh air louver to a closed position preventing the chilling of any piping into the boiler room.

Switch on the motor should prevent burner from starting if louvers fail to open.

Proper screening should be provided.

If automatic louver is not required, stationary louvers are satisfactory.

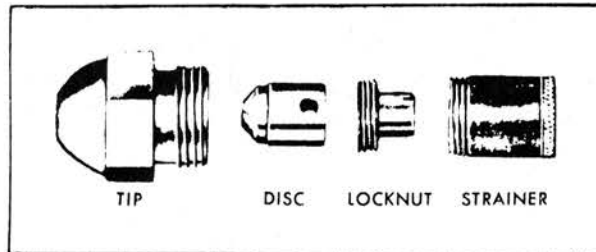
Sufficient amount of ventilation should be furnished into the upper section of boiler room to keep the ambient temperature below 90° F.

Boiler Horsepower	Equivalent Free Area Opening
100 - 150	35" x 40"

The area around the unit and its components must be maintained and serviced. Check dimensions of the burner and components so that ample space is available to perform these functions and meet local codes.

VII. SERVICE, MAINTENANCE AND STARTING INSTRUCTIONS FOR BURNER.

The starting and operation of the burner is just as important as the installation. If a good installation is made and the unit is not properly started and the operator not properly instructed, maximum operating efficiency cannot be obtained. For the proper procedures of starting, and maintaining the equipment, these instructions are provided by **DONLEE Technologies**



The Oil Burning Nozzle prepares the oil for burning by properly atomizing the fuel. Therefore, this assembly should be properly adjusted and cleaned. When assembly is removed, careful note should be made of the dimensions and returned as per drawing provided. A detail of the nozzle is provided above.

NEW NOZZLES

If a new nozzle does not spray properly, polish the orifice with a round sharpened toothpick. This will remove any test oil which may not have been flushed out completely and, later, congealed in the orifice.

HANDLING

Always handle a nozzle as carefully as you would a fine watch. It is a precision piece of equipment, easily damaged by careless or rough treatment. NEVER clean orifices with needles, pins, wires or ANY sharp metal as the least scratch will ruin the spray and damage the nozzle permanently. Keep your stock nozzles in individual containers as supplied from the factory—DON'T place them loosely in your toolbox or a bag and expect them to be usable.

CLEANING

Remove strainer, locknut and disc from tip. Brush parts thoroughly, particularly the slots of the disc and the inside of the tip. Use a Monarch brass wire nozzle brush. Soak in carbon tetrachloride or any good carbon solvent, and then rinse thoroughly with hot water. Polish orifice lightly, front and rear, with a round sharpened toothpick.

CAUTION: Be sure hands and tools are clean before re-assembling. Re-assemble disc and locknut in tip and tighten firmly with screw driver, holding tip in socket or box wrench or a vise. Re-assemble strainer, first making sure that parts are free of any loose wires, lint, sludge, etc., then screw it into the tip, finger tight.

STRAINERS

Strainers should always be used with nozzles up to about 5.00 GPH and may be used for as large as 12.50 GPH if desired. They will not fit sizes over 12.50 GPH.

To clean nozzle make sure the main disconnect switch is open. Drain fuel oil from nozzle lines. Disconnect electrode cables and fuel lines; loosen allen set screw between mounting plate and holder, withdraw nozzle and electrode assembly. When returning assembly, make sure holder is flush to mounting plate.

NOTE: Extreme care should be taken to adjust electrode as per dimensions.

LUBRICATION PROCEDURE & REQUIREMENTS FOR STEAM-PAK MOTORS

A. Ball Bearing (Identified by plugged grease ports)

1. To add grease periodically:

- a. Check grease level in bearings each month adding grease only if necessary. Too much grease may be just as damaging as too little. Housing should be at least 1/3 full but never more than 2/3 full.
- b. When greasing use only a hand operated pressure gun.
- c. Wipe clean the plugged hole and the regions around hole and relief plug. (G.E. motors use pressure fitting.)
- d. Remove both filler plug and relief plug to prevent a pressure build up.
- e. Free relief hole of hardened grease.
- f. Add grease with motor running until it is expelled through the relief hole.
- g. Run motor for several minutes with relief plug removed to expel excess grease and relieve pressure which may have been built up.
- h. Clean and replace relief plug.

2. To Clean and Re-Grease:

- a. Bearings should be cleaned and regreased once a year.
- b. Follow through on Section 1, items c, d and e.
- c. Replace relief plug and fill housing with solvent, with motor running. After 10 minutes drain off solvent. Repeat this process until solvent comes out clear. If carbon tetrachloride is used for flushing, rinse housing with small amounts of light mineral oil.
- d. Follow through on Section 1, items f, g and h.

3. Motors with special characteristics:

- a. High speed motors (3450 RPM) should be greased every six months.
- b. Motors 7-1/2 HP or greater should use at least one ounce of grease every six months.
- c. Westinghouse pre-lubricated ball bearings provide adequate lubrication for at least five years. At the end of five years the shield on the outer end of the bearing should be removed and the grease examined. If grease is discolored and has a bad odor, bearings should be cleaned and re-packed with grease. If not, shield may be replaced and the bearings put back into service for several years.

B. Sleeve Bearings (Usually identified by spring capped oil fill)

1. Periodic Oiling:

- a. Check oil on sleeve bearing once a month.
- b. To add oil, motor should be stationary. A false oil level is shown when motor is running. It may be high or low, depending on direction of rotation. Always fill to near to near the top of housing.
- c. Always wipe up surplus oil. Exterior oil is sign of a leak. If found, determine cause and correct.

2. To clean and re-oil sleeve bearings:

- a. Bearings should be cleaned and re-oiled every six months. However, if oil is dirty and emulsified before this time, clean more often.
- b. To clean bearings flush through filler cap with drain plug removed.
- c. After draining, seal threads of drain plug with an oil sealing compound and refill the oil reservoir.

3. Motors with special characteristics.

- a. High speed motors (3450 RPM) should be re-oiled every 3 months.
- b. Motors 7-1/2 HP or greater should be re-oiled every 3 months.

C. Lubricants for Ball Bearings

1. Gould Motors:

- a. Fractional Horsepower Motor Bearings: Pre-lubricated, no further lubrication necessary.
- b. Integral Horsepower Motor Bearings: Relubricate with Non-Fluid Oil Corp G-60 or Chevron SRI #2 grease unless otherwise stamped on the nameplate.

2. G. E. Motors:

- a. G. E. Grease Specification D6A2C5 - General Electric Co., Schenectady, N.Y.
- b. A grease with following characteristics:
 - 1. ASTM worked consistency 270-290 with minimum change over range of operating temperatures.
 - 2. Melting point preferably above 150°C.
 - 3. Freedom from separation of oil and soap.
 - 4. Freedom from abrasive matter and acidity.

3. Westinghouse Motors:

- a. Use Westinghouse 53701RY grease unless a special grease is specified on the nameplate. Some equivalent greases are:
 - Chevron SRI-2 - Standard Oil of California
 - Premium RB - Texaco Inc.
 - Unirex N2 - Exxon
 - Dolium R - Shell Oil Company
 - Rykon Premium - American Oil
- b. Lubricate approximately every two years - 1800 RPM & every year - 3600 RPM.

4. Marathon Motors:

- a. Frame 56 Motor Bearings: Sealed lubricated bearings require no attention. (Five Year Life)
- b. All Other Frame Sizes: Alvania #2, Shell Oil Company or equivalent. Relubricate approximately every two and one-half years.

5. Reuland Motors:

- a. Reuland Motors feature lifetime lubricated, Sealed Ball Bearings, grease packed and sealed by the Bearing Manufacturer.

6. Baldor Motors:

- a. For motors 1/8 to 7-1/2 HP, relube every five years. For motors 10 to 40 HP, relube every three years.
- b. Frame 215T and smaller motor bearings: Alvania #2, Shell Oil Company or equivalent.
- c. Frame 254 and larger motor bearings: Dolium R, Shell Oil Company or equivalent.

D. Lubricant for Sleeve Bearings

1. G. E. Motors:

- a. SAE 10 viscosity turbine oil for motors up to 1/2 HP.
- b. SAE 20 viscosity turbine oil for motors 1/2 HP and larger.

2. Westinghouse Motors:

- a. PD-2268 Westinghouse specification number.
- b. SAE 10 viscosity for motors up to 1/2 HP.
- c. SAE 20 viscosity for motors 1/2 HP and larger.

3. Marathon Motors:

- a. Reoil with SAE No. 10 oil for every 2000 hours of motor operation.

NOTE: NEVER LUBRICATE COMMUTATORS.
NEVER OVERLUBRICATE

STARTING THE OIL BURNER MODEL FV-40-2

After all pipe lines have been tested and all electrical connections have been made, the fuses should be fastened in their proper places, the automatic controls adjusted to operate the burner, and the burner motor oiled with SAE No. 20 Motor Oil.

There should be sufficient oil in the tank. The oil lines and pump should be freed of air by running the burner and bleeding the air through the gauge port of the fuel unit until oil runs free of bubbles. An oil pressure gauge should be used when adjusting the pump pressure. Set pump pressure at 100 P.S.I.

1. Turn off manual gas pilot cock.
2. Shut off main electrical disconnect switch to burner.
3. Bleed gas line.
4. Install DC voltmeter in control test jacks and set burner air adjustment 1/2 open. Close main electrical switch, close operating control and Emergency Switch (if used).
5. Open pilot gas cock. After 90 seconds pre-purge, slowly adjust gas regulator until DC voltmeter indicates proper voltage (Refer to Safety Control Bulletin for proper voltage). Cycle pilot Emergency switch or operating control to check performance. When burner is equipped with Fireye PBC-2 control, contacts K-12 can be held open by inserting paper between them. This disengages clock and allows manual control of programmer; set dial at "1" to energize pilot valve. Note: With dial stopped at number "1" position, control will lock out on safety after 15 seconds even though pilot is lit.

5a. When using the Series D Fireye programmer, after prepurge the (TFI) trial for ignition light will indicate, providing the low fire start switch is electrically closed. With DC voltmeter connected to the amplifier module jacks programming can be stopped by placing the "check-run" switch (located on the side of the programmer module) in the "check" position. A small tool such as a small screwdriver can be used. This will allow time for adjustment of pilot to maximum DC voltage indication. (Refer to the Fireye Safety Control Bulletin for the proper DC voltage).

6. When satisfied with pilot performance, bring on main flame manually with main gas cock. (NOTE: When using PBC-2 programmer, remove the paper from contacts K-12, this will allow timer to proceed to the #2 position).

When using Series D Fireye programmer, move the "Check-run" switch to the run position and proceed as follows:

Metering of the air for combustion is accomplished by the air damper. An upward position of the lever allows more air to enter the combustion chamber while a downward position of the lever allows less air to enter the combustion chamber. After setting the air damper to the desired position it should be locked in place by tightening the linkage.

To obtain the best burner operation three adjustments are usually necessary.

1. The air damper that regulates the volume of air should be set to produce the proper flame color. Increasing the volume of air will produce a flame changing from yellow toward white. Too much air usually produces a fire having sparklers and can be detected by a strong odor. Decreasing the volume of air will produce a flame changing from white through yellow into an orange color with dark smoky tips at the ends of the flames. The best setting should yield a flame between yellow and orange color with no smoky tips.

2. The oil pressure of the pump should be adjusted between 90 and 120 P.S.I. To get the best setting vary the pressure between these two settings until needle on pressure gauge remains stationary or has the least movement. If gauge is not available do not alter this setting more than 1-1/2 turns from the original setting. Changing this setting may reduce flicker in flame due to variable pressure.

3. Lengthwise movement of the nozzle pipe assembly forward or back to give the best mixture of oil and air at the air nose. To make this adjustment, loosen the nut holding the assembly in position. Lock securely when finished and check bus bars to be sure they are in position.

GENERAL SERVICE MODEL FV-40-2

A. If Oil Fails To Ignite

1. Make certain there is oil in the tank.
2. Check oil pressure - standard setting 100 P.S.I. If no pressure is developed, bleed air from pump through gauge port opening.
3. Remove nozzle pipe assembly. Check electrode setting both as to spark gap and position of tips in relation to nozzle and check tightness of nozzle.
4. If electrode setting is correct, clean nozzle as follows:
 - a. Remove nozzle from nozzle adapter.
 - b. Screw out nozzle strainer and insert.
 - c. Wash all nozzle parts in very hot water or in carbon tetrachloride, making certain there are no dirt particles in the slots or nozzle orifice. UNDER NO CIRCUMSTANCES, USE A PIN OR A NEEDLE TO CLEAN SLOTS AND ORIFICE. Use the edge of a piece of hard paper to clean slots. Use clean rags and keep hands free from grit and dirt while working with nozzle parts. IT MAY SAVE YOU A REPEAT SERVICE CALL.
 - d. Assemble nozzle and install in nozzle adapter.
5. Check transformer for proper spark as follows:
 - a. Remove motor lead from transformer terminal.
 - b. Remove nozzle pipe assembly from burner and connect bus bars to transformer clips. WARNING: BUS BARS CARRY HIGH VOLTAGE - KEEP CLEAR OF THEM WHEN BURNER IS ON.
 - c. Turn burner on - spark should be strong enough that you cannot blow spark from electrode tips.

B. If Fire Is One Sided

1. Follow steps A-3 and A-4 and if fire is still one sided, install a new nozzle.

C. If Fire Is Well Centered But Rough

1. Check oil pressure - standard setting 100 P.S.I.
2. Clean nozzle as described under A-4.
3. Adjust nozzle pipe assembly to the rear position (toward burner cover plate).
4. Adjust pump pressure between 90 and 125 P.S.I. and set at point which gives best operation.

GENERAL SERVICE CONT'D

5. Check for fluctuating pump pressure - this may be corrected by step C-4.
 6. Check for oil leaks in suction line or on suction side of fuel unit - check particularly at oil line filter and fuel unit end plate. An air leak will generally be indicated by an intermittent hissing sound at the fuel unit or by unsteady pump pressure. Air leaks MUST be eliminated.
 7. Increase air by rotating air damper slightly.
- D. If After Fire or "Bump" Occurs on Shut-Down.
1. Adjust nozzle pipe assembly to rear position (toward burner cover plate).
 2. Make certain air is purged from fuel unit and nozzle pipe assembly.
 3. Increase pump pressure 5 to 10 P.S.I.
 4. Check for air leaks in suction line and suction side of fuel unit (See C-6).
 5. Check for excessive vacuum on pump by inserting vacuum gauge in unused suction opening in fuel unit. Vacuum should not be over 7". High vacuum may be caused by kinked suction line, dirty oil line filter or dirty strainer in pump.
 6. Remove cut-off valve piston (under hex nut on fuel unit) and remove any dirt particles on neoprene seat in the end of piston.
- E. If Fire Puffs on Start
1. Follow step A-3.
 2. Check for air leaks in suction line on suction side of fuel unit (See C-6).
 3. On a two-pipe system, check for leaking check valve in suction line by putting pressure on suction line between fuel unit and check valve with a pressure gauge so placed as to show if pressure is holding or not. DISCONNECT SUCTION LINE FROM PIPE.
- F. If Fire Is Smoky
1. Increase air by rotating air damper to point where fire is clean.
 2. Check for dirt and lint in fan wheel or at air intake.
 3. Check for obstruction in chimney.
 4. Clean nozzle as described under A-4.
 5. Install new nozzles.
 6. Check for low pump pressure - less than 80 P.S.I.

YEARLY SERVICE

1. Clean boiler or furnace thoroughly and have service man check burner firing rate.
2. Clean burner thoroughly, remove and clean nozzle with care so that surface inside tip is not scratched; if badly caked, replace.
3. Clean and properly reset electrodes. Refer to Parts Identification Drawing.
4. Clean burner fan, housing and blast tube.
5. Remove (8) cap screws from end cap of pump. Remove pump strainer. Clean thoroughly. Replace gasket on pump with a new one.
6. Replace filter cartridge (if filter is used).
7. Use a few drops of S.A.E. No. 20 motor oil for the two oil cups on burner motor (every six months).

STARTING THE GAS BURNER MODEL FV-40-N

After all pipe lines have been tested and all electrical connections have been made, the fuses should be fastened in their proper places, the automatic controls adjusted to operate the burner, and the burner motor oiled with SAE No. 20 motor oil.

NOTE: Remove dust plug from bleed port of main gas valve.

1. Turn off main manual gas cock and pilot cock.
2. Shut off main electrical disconnect switch to burner.
3. Bleed gas line.
4. Install DC voltmeter in control test jacks and set burner air adjustment 1/2 open. Close main electrical switch, close operating control and Emergency Switch (if used).
5. Open pilot gas cock. When equipped with a PBC-2 control, after 90 seconds, pre-purge, slowly adjust gas regulator until DC voltmeter indicates proper voltage (Refer to Safety Control Bulletin for Proper Voltage). Cycle pilot Emergency Switch or operating control to check performance. Contacts K-12 can be held open by inserting paper between them. This disengages clock and allows manual control of programmer; set dial at "1" to energize pilot valve. Note: With dial stopped at number "1" position, control will lock out on safety after 15 seconds even though pilot is lit.
- 5a. When using the Series D Fireye programmer, after prepurge the (TFI) trial for ignition light will indicate, providing the low fire start switch is electrically closed. With DC voltmeter connected to the amplifier module jacks programming can be stopped by placing the "Check-run" switch (located on the side of the programmer module) in the "check" position. A small tool such as a small screwdriver can be used. This will allow time for adjustment of pilot to maximum DC voltage indication. (Refer to the Fireye Safety Control bulletin for the proper DC voltage).
6. When satisfied with pilot performance, bring on main flame manually with main gas cock. (NOTE: When using PBC-2 programmer remove the paper from contacts K-12, this will allow timer to proceed to the #2 position).

When using Series D Fireye programmer move the "Check-run" switch to the run position and proceed as follows: Fully open the main gas cock and adjust air control at inlet to burner fan. Check gas rate with meter, if possible. Gas rate can be adjusted with butterfly valve or regulator. Adjustment of the air damper should be made so that CO₂ reading (taken at inlet to breeching) of 8-1/2 to 9-1/2% is obtained. After the burner is adjusted recheck pilot performance and cycle unit several times to be sure that all controls are working properly. Natural draft installations should provide 0.02" to 0.05" w.c. draft over the fire; in no case should chamber pressure (on forced draft equipment) exceed 0.25" w.c.

GENERAL SERVICE

- A. When adjusting the main flame, a forward or rearward adjustment of the ignitor assembly can affect the flame pattern. Generally, the proper setting is with the ignitor funnel flush with the forward edge of the gas head. When adjustments are correct, a quiet, blue flame with orange tips should result.
- B. As part of routine service, the position of ignition electrode should be checked.
- C. If Main Gas Valve will not open after pilot is established, check to see that Burner Air Switch contacts are made.

STARTING THE DUAL FUEL BURNER MODEL FV-40-N2

After all pipe lines have been tested and all electrical connections have been made, the fuses should be fastened in their proper places, the automatic controls adjusted to operate the burner, and the burner motor oiled with SAE No. 20 motor oil.

NOTE: Remove dust plug from bleed port of main gas valve.

1. Turn off main manual gas cock and pilot cock.
2. Shut off main electrical disconnect switch to burner.
3. Bleed gas line through second pilot tapping in main shutoff cock.
4. Install DC voltmeter in control test jacks and set burner air adjustment 1/2 open. Close main electrical switch, operating control and "Emergency Switch" (if used). Set Fuel Valve Switch to Gas.
5. Open pilot gas cock. After 90 seconds pre-purge, slowly adjust gas regulator until DC voltmeter indicates proper voltage (Refer to Safety Control Bulletin for Proper Voltage). Cycle pilot Emergency Switch or operating control to check performance. When burner is equipped with Fireye PBC-2 control, contacts K-12 can be held open by inserting paper between them. This disengages clock and allows manual control of programmer; set dial at "1" to energize pilot valve. Note: With dial stopped at number "1" position, control will lock out on safety after 15 seconds even though pilot is lit.

5a. When using the Series D Fireye programmer, after prepurge the (TFI) trial for ignition light will indicate, providing the low fire start switch is electrically closed. With DC voltmeter connected to the amplifier module jacks programming can be stopped by placing the "check-run" switch (located on the side of the programmer module) in the "check" position. A small tool such as a small screwdriver can be used. This will allow time for adjustment of pilot to maximum DC voltage indication. (Refer to the Fireye Safety Control bulletin for the proper DC voltage).

6. When satisfied with pilot performance, bring on main flame manually with main gas cock. (NOTE: When using PBC-2 programmer remove the paper from contacts K-12, this will allow timer to proceed to the #2 position.

When using Series D Fireye programmer move the "Check-run" switch to the run position and proceed as follows:

Fully open the main gas cock and adjust air control at inlet to burner fan. Check gas rate with meter, if possible. Gas rate can be adjusted with butterfly valve or regulator. Adjustment of the air damper should be made so that a CO₂ reading (taken at inlet to breeching) of 8-1/2 to 9-1/2% is obtained. "Turn burner off and set Fuel Valve Switch to Oil". Start burner and check light-off and combustion of oil fire. Since oil and gas rates are matched, an oil CO₂ sample should be 10 to 11%. If air settings or fuel rates of either fuel are changed, combustion of both fuels should be rechecked. After the burner is adjusted, recheck pilot performance and cycle unit several times to be sure that all controls are working properly. Natural draft installations should provide 0.02" to 0.05" w.c. draft over the fire; in no case should chamber pressure (on forced draft equipment) exceed 0.25" w.c.

GENERAL SERVICE

A. When adjusting the main flame, a forward or rearward adjustment of the nozzle-electrode-ignitor assembly can affect the flame pattern. When adjustments are correct, a fast blue gas flame and clean, bright oil flame should result.

B. As part of routine service, the position of the ignition electrode should be checked.

C. If main fuel valves will not open after pilot is established, check to see that Burner Air Switch contacts are made.

**FULLY MODULATED LIGHT OIL (#2) BURNERS
USING PRESSURE ATOMIZATION (OPTION)**

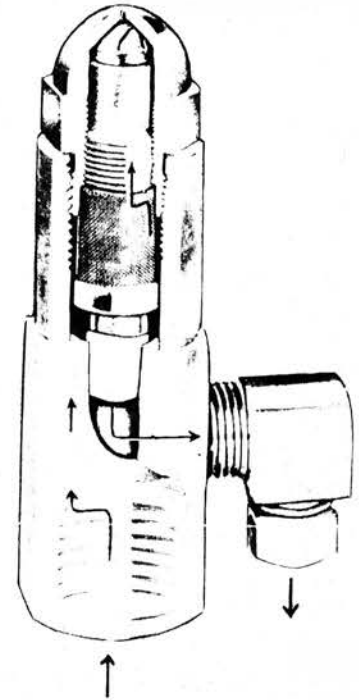
As an optional arrangement, pressure atomized light oil burners are available for full range modulation.

This is accomplished by using a by-passing nozzle which produces a variable firing rate by by-passing fuel from the nozzle swirl chamber.

The nozzles are rated and stamped with the capacity when operating at 100 PSI with the by-pass closed. With the by-pass opened, the firing rate will decrease. These nozzles may be operated at supply pressures in excess of 100 PSI. At this increased nozzle pressure, the nozzle will deliver a greater quantity of fuel.

The variable pressure needed to change the firing rate is accomplished with a modulating metering oil valve on the return line, connected to a linkage, and operated by modulating motor which also controls the blower air damper.

The oil flow to the nozzles is controlled by a solenoid valve in the supply line, and a safety solenoid in the return line prevents back flow from the return line.



F-80-BPS NOZZLE

*** TYPICAL PRESSURE SETTINGS**

BOILER HORSEPOWER	PUMP PRESSURE	RETURN PRESSURE	
		HIGH	LOW
100 Thru 150	145 P.S.I.	85	15

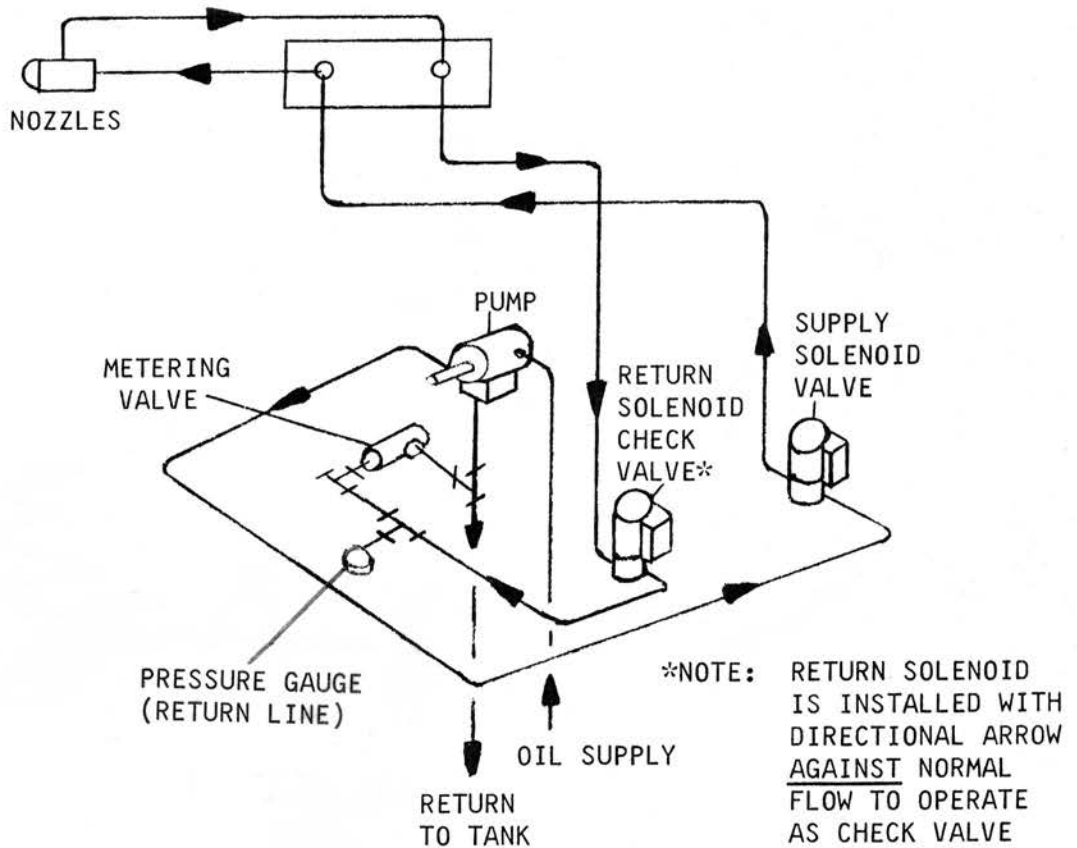
* THESE ARE AVERAGE AND WILL VARY SLIGHTLY FROM INSTALLATION TO INSTALLATION

TYPICAL SETTINGS FOR FV-40 BURNERS

BOILER HORSEPOWER	FUEL	FUEL RATE	CO ₂ %	NOZZLE OIL PRESS.	GAS MAN. PRESS.
100	Gas	4190 C.F.H.	9.0	-	4.0" W.C.
	Oil	29.5 G.P.H.	11.0	115 P.S.I.	-
125	Gas	5234 C.F.H.	9.5	-	4.5" W.C.
	Oil	37.0 G.P.H.	11.5	115 P.S.I.	-
150	Gas	6100 C.F.H.	9.5	-	6.5" W.C.
	Oil	43.5 G.P.H.	11.5	115 P.S.I.	-

NOTE: The above "typical readings" are for general use only. Specific installation readings may vary due to various types of burner applications. Burner start-up and service personnel should adjust all settings for maximum efficiency operation.

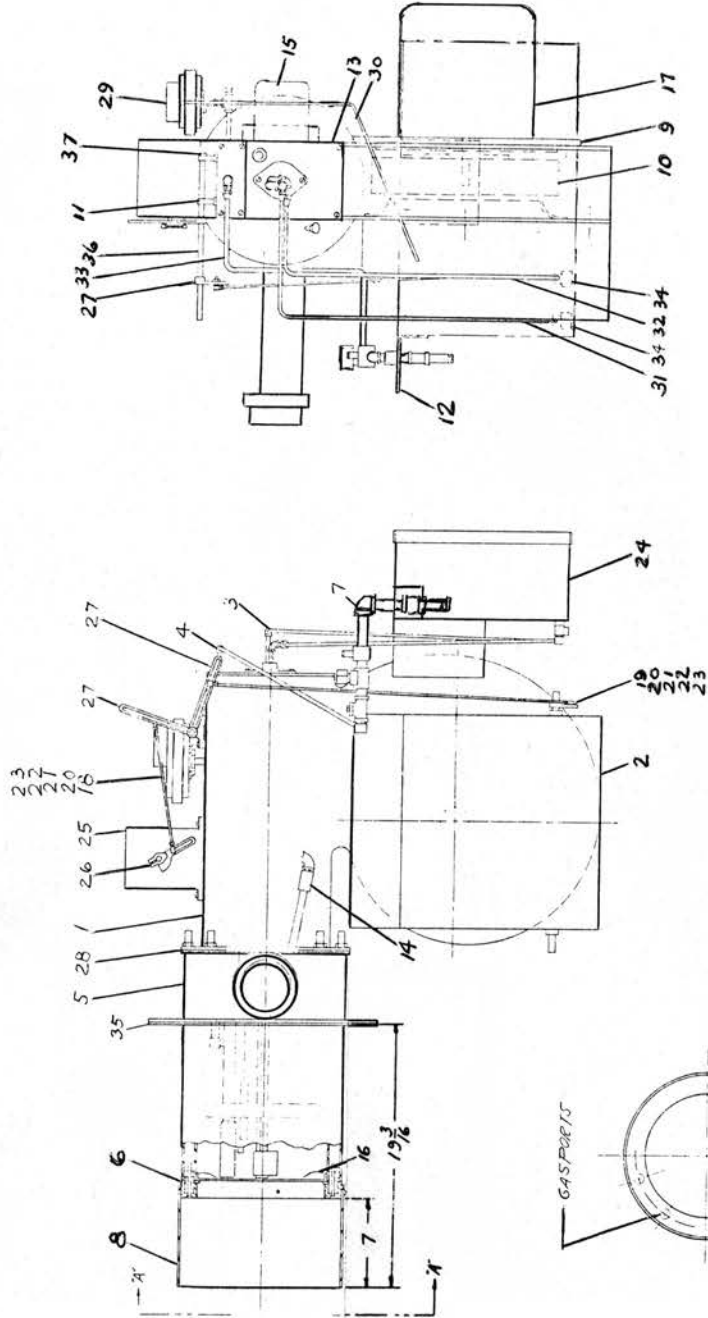
**SCHEMATIC PIPING ARRANGEMENT
FOR LIGHT OIL FULL MODULATION WITH MECHANICAL ATOMIZATION**



PARTS REFERENCE DRAWING FOR FV-40 OIL FIRED BURNER

FV - NOZZLE CHART			
BURNER UNIT	NOZZLE SIZE	PLP	PART NO.
100 H.P.	(2) 8.3 GPH x 60°	PLP	61167
	(1) 12.0 GPH x 60°	PLP	61200
125 H.P.	(3) 12.0 GPH x 60°	PLP	61200
	(2) 13.8 GPH x 60°	PLP	65661
150 H.P.	(1) 15.3 GPH x 60°	PLP	61169

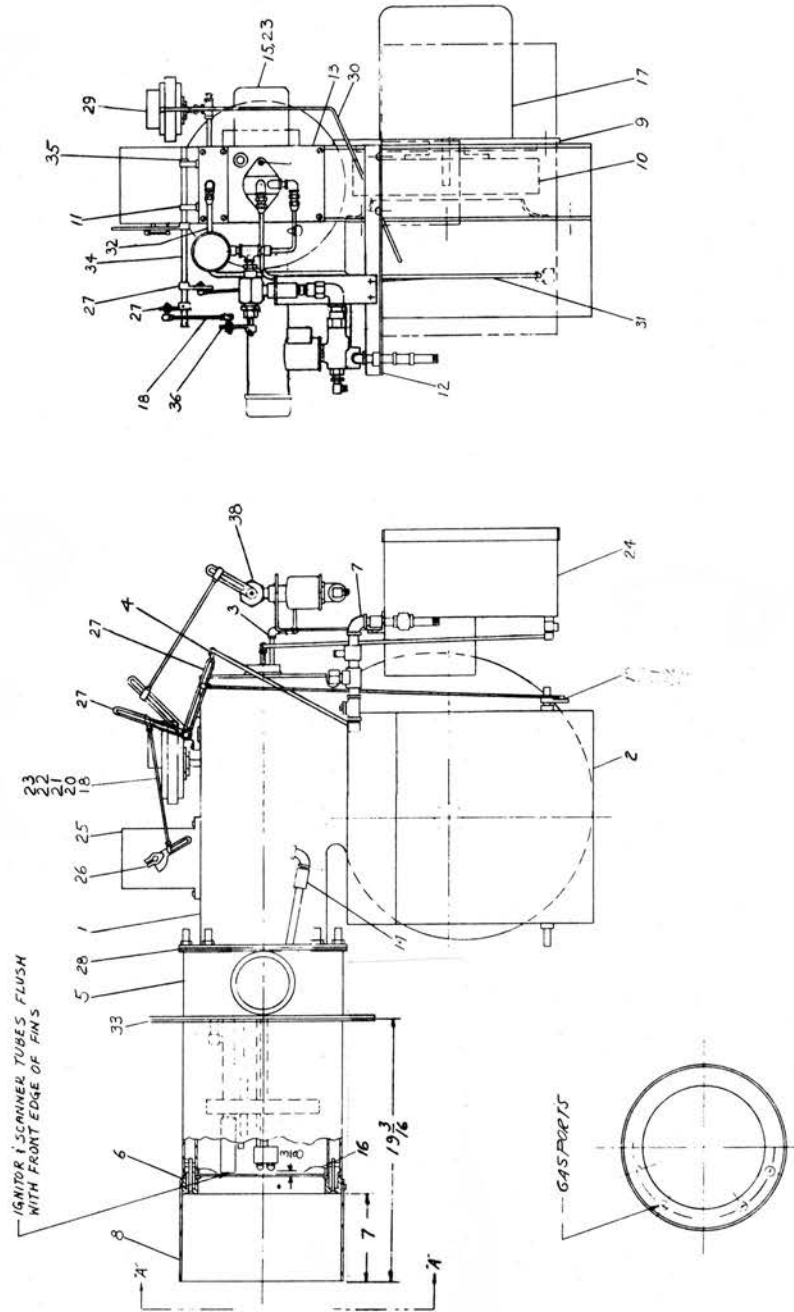
Ref. No.	No.	Part Name	Part No.	Ref. No.	No.	Part Name	Part No.
1	1	Blower Housing Assembly	157337	20	4	Ball & Socket Joint 1/4 - 28	66728
2	1	Air Damper Assembly	157252	21	4	Flatwasher 1/4	105149
3	1	Nozzle Pipe Assembly	157304	22	4	Lockwasher 1/4	105157
4	1	Ignitor Pipe Assembly	157312	23	6	Hex Nuts 1/4 - 28	58567
5	1	Burner Tube Assembly	157348	24	1	Panelboard Assembly	141818
6	1	Orifice Plate	157335	25	1	Modutrol Motor, Honeywell	106722
7	1	Pilot Line Assembly	157336	26	1	Crankarm #106013-A	69800
8	1	Burner Extension Tube	157355	27	2	Linkage Arm	46932
9	1	Motor Mounting Plate	96126	28	1	Gasket Burner to Burner Tube	157410
10	1	Blower Wheel	102089	29	1	Switch Contactor DFSH-C0	68587
11	2	Bearing Block	24179	30	1	Air Switch Tubing Assembly	157391
12	1	Gas Train Support Pilot	157475	31	1	Oil Tubing Assembly	157392
13	1	Bottom End Cover Assembly	157396	32	1	Oil Tubing Assembly	157390
14	1	Firebox & Scanner Tube Assembly	157394	33	1	Gas Tubing Assembly	157389
15	1	Transformer LEEW	54671	34	2	Oil Valve W/4668	103405
16	1	Air Whirl Assembly	157428	35	1	Mounting Flange Gasket	157485
17	1	Motor, 5 HP, 3450 RPM 3 Phase	61603	36	1	Linkage Drive Shaft	39638
18	1	Fr. 213		37	1	Linkage Drive Collar	56757
19	1	Linkage Rod (Specify Length)					



PARTS REFERENCE FOR FV-40 OIL FIRED FULL MODULATION BURNER

BOILER H.P.	NO.	NOZZLE SIZE
100	106253	1 - 12.0 Gal., 80°
	106280	2 - 8.3 Gal., 80°
125	106253	3 - 12.0 Gal., 80°
	106709	1 - 15.3 Gal., 60°
150	106708	2 - 13.8 Gal., 60°

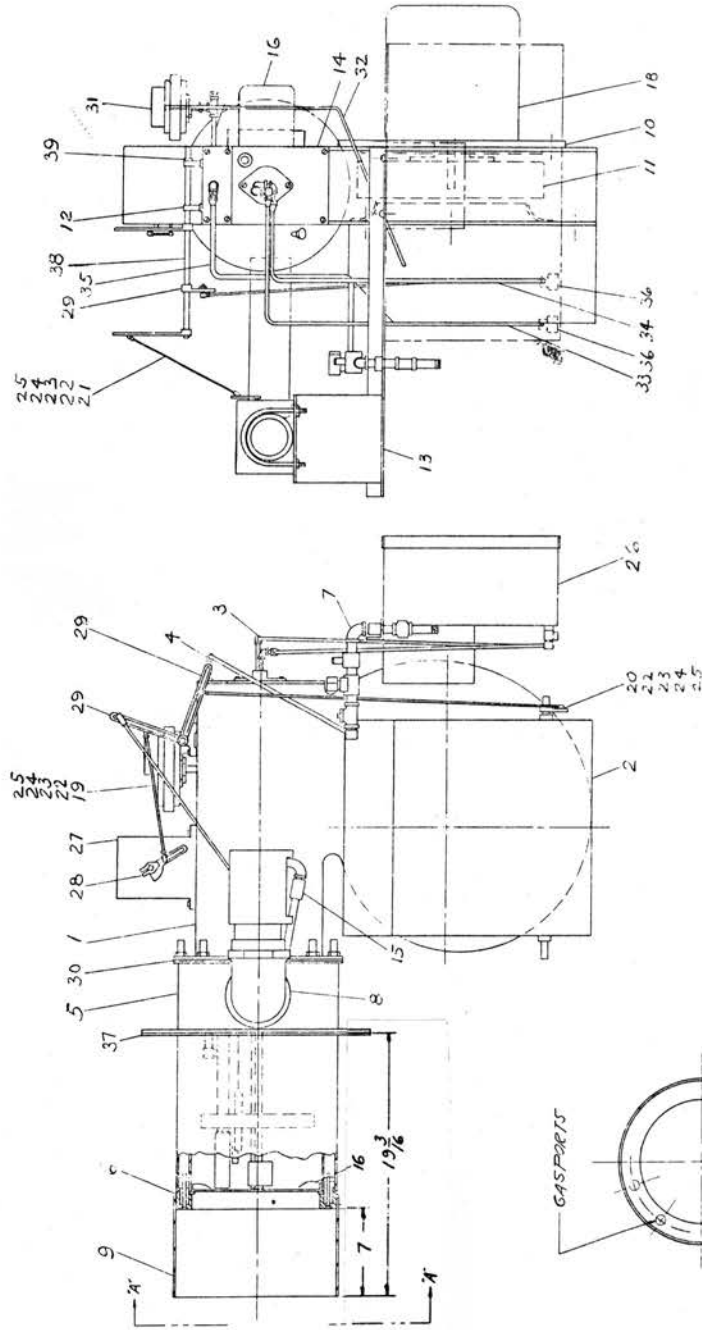
Ref. No. No.	Part Name	Part No.
1	Blower Housing Assembly	157337
2	Air Damper Assembly	157252
3	Nozzle Pipe Assembly	159360
4	Ignitor Pipe Assembly	157312
5	Burner Tube Assembly	157346
6	Orifice Plate	157335
7	Pilot Line Assembly	157336
8	Burner Extension Tube	157355
9	Motor Mounting Plate	96126
10	Blower Wheel	102089
11	Bearing Block	24179
12	Gas Train Support Angle Assy	159771
13	Bottom End Cover Assembly	157396
14	Fireye & Scanner Tube Assembly	157394
15	Transformer LEEB	54671
16	Air Whirl Assembly	157428
17	Motor, 5 HP, 3450 RPM 3 Phase	61603
18	Linkage Rod (Specify Length)	Fr. 213
19	Linkage Rod (Specify Length)	
20	Ball & Socket Joint 1/4 - 28	66728
21	Flatwasher 1/4	105149
22	Lockwasher 1/4	105157
23	Hex Nuts 1/4 - 28	56567
24	Panelboard Assembly	141819
25	Modutrol Motor, Honeywell	106722
26	PP344-1318	
27	Crankarm #106013-A	69800
28	Linkage Arm	24178
29	Gasket Burner to Burner Tube	157410
30	Switch Contactor DF5H-C0	68587
31	Air Switch Tubing Assembly	157391
32	Oil Tubing Assembly	157390
33	Gas Tubing Assembly	157389
34	Mounting Flange Gasket	157481
35	Linkage Drive Shaft	39638
36	Drive Shaft Collar	56757
37	Linkage Arm	22665
38	Linkage Arm	45932
39	011 Metering Arrangement (Consists of the following) Pressure Gauge 2-1/2" 0-160# Solenoid Valve IIT R10A-281 Snubber Metering Valve Assembly 011 Pump Assembly	51089 50657 67304 155514 159387



PARTS REFERENCE DRAWING FOR FV-40 GAS-OIL BURNER

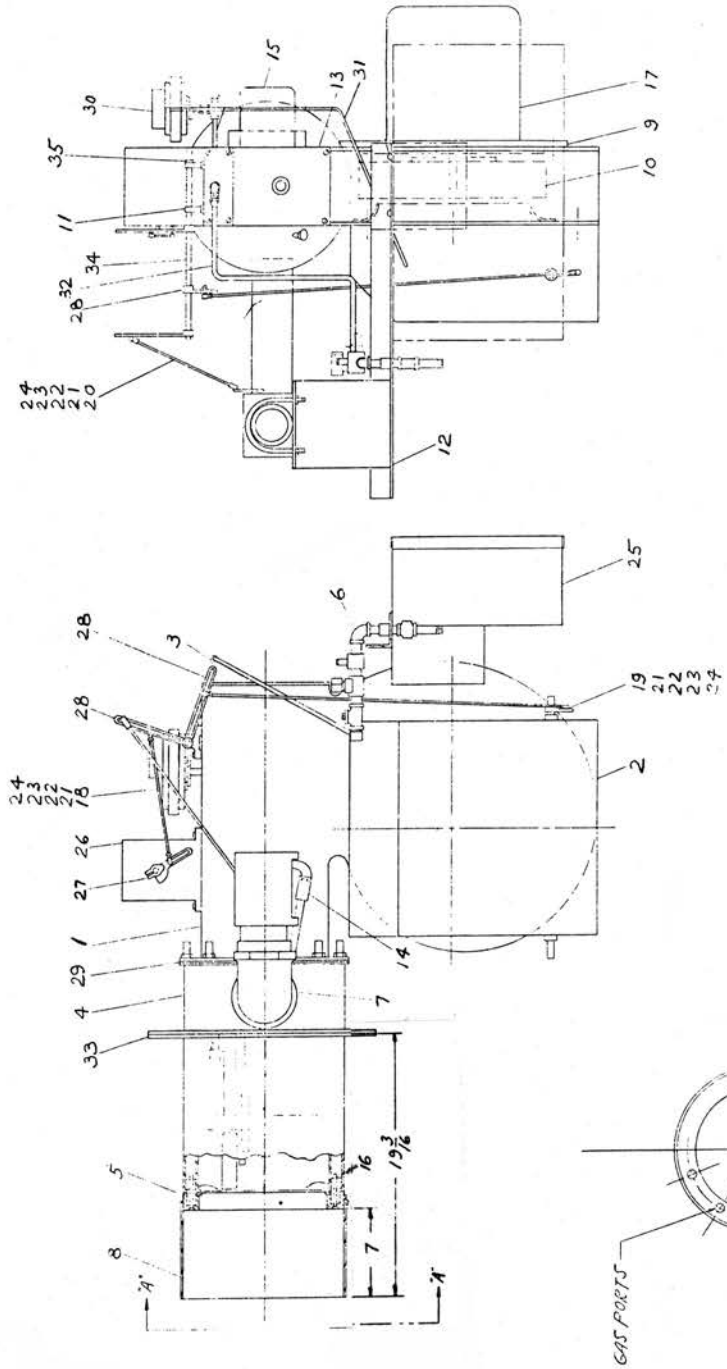
FV - NOZZLE CHART		
BURNER	UNIT	NOZZLE SIZE
FV-40	100 H.P.	(2) 8.3 GPH x 60° PLP
	125 H.P.	(1) 12.0 GPH x 60° PLP
FV-40	125 H.P.	(3) 12.0 GPH x 60° PLP
	150 H.P.	(2) 13.8 GPH x 60° PLP
		(1) 15.3 GPH x 60° PLP

Ref. No.	No.	Qtd.	Part Name	Part No.
1	1	1	Blower Housing Assembly	157337
2	1	1	Air Damper Assembly	157252
3	1	1	Nozzle Pipe Assembly	157304
4	1	1	Ignitor Pipe Assembly	157312
5	1	1	Burner Tube Assembly	157348
6	1	1	Orifice Plate	157335
7	1	1	Pilot Line Assembly	157336
8	1	1	Main Gas Train Assembly (Under 5,000,000 BTU)	157388
			(Over 5,000,000 BTU)	157452
9	1	1	Burner Extention Tube	157355
10	1	1	Motor Mounting Plate	96126
11	1	1	Blower Wheel	102089
12	2	2	Bearing Block	24179
13	1	1	Gas Train Support Angle Assy	157477
14	1	1	Bottom End Cover Assembly	157396
15	1	1	Firey & Scanner Tube Assy	157394
16	1	1	Transformer	54671
17	1	1	Air Whirl Assembly	157428
18	1	1	Motor, 5 HP 3450 RPM 3 Ph. Fr. 213	61603
19	1	1	Linkage Rod (Specify Length)	66728
20	1	1	Linkage Rod (Specify Length)	105149
21	1	1	Linkage Rod (Specify Length)	58567
22	6	6	Ball & Socket Joint 1/4" - 28	105157
23	6	6	Flatwasher 1/4"	58567
24	6	6	Lockwasher 1/4"	141825
25	8	8	Hex Nuts 1/4" - 28	106722
26	1	1	Panelboard Assembly	69800
27	1	1	Modutrol Motor M9344-1318	45932
28	1	1	Crankarm #106013-A	157410
29	3	3	Linkage Arm	68587
30	1	1	Gasket, Burner to Burner Tube	157391
31	1	1	Switch Contactor DFSH-CO	157392
32	1	1	Air Switch Tubing Assembly	157390
33	1	1	Oil Tubing Assembly	157389
34	1	1	Oil Tubing Assembly	103405
35	1	1	Gas Tubing Assembly	157481
36	2	2	Oil Valve V40468	39638
37	1	1	Mounting Flange Gasket	56757
38	1	1	Linkage Drive Shaft	
39	1	1	Drive Shaft Collar	



PARTS REFERENCE DRAWING FOR FV-40 GAS BURNER

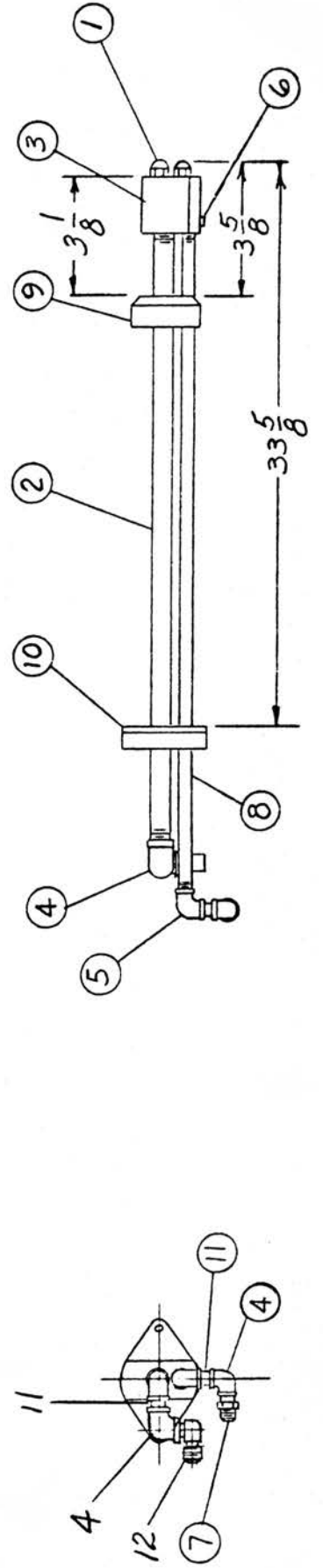
Ref. No. No.	Ref. No. Rqd.	Part Name	Part Name	Part No.	Part No.	Part No.	Part No.
1	1	Blower Housing Assembly	Linkage Rod (Specify Length)	157337	18	1	Linkage Rod (Specify Length)
2	1	Air Damper Assembly	Linkage Rod (Specify Length)	157252	19	1	Linkage Rod (Specify Length)
3	1	Ignitor Pipe Assembly	Linkage Rod (Specify Length)	157345	20	1	Linkage Rod (Specify Length)
4	1	Burner Tube Assembly	Ball & Socket Joint 1/4" - 28	157348	21	6	Ball & Socket Joint 1/4" - 28
5	1	Orifice Plate	Flatwasher 1/4"	157335	22	6	Flatwasher 1/4"
6	1	Pilot Line Assembly	Lockwasher 1/4"	157336	23	8	Lockwasher 1/4"
7	1	Main Gas Train Assembly (Under 5,000,000 BTU)	Hex Nuts 1/4" - 28	157388	24	8	Hex Nuts 1/4" - 28
8	1	Burner Extension Tube (Over 5,000,000 BTU)	Panelboard Assembly	157490	25	1	Panelboard Assembly
9	1	Motor Mounting Plate	Modutrol Motor M934A-1318	157355	26	1	Modutrol Motor M934A-1318
10	1	Blower Wheel	Crankarm #106013	96126	27	1	Crankarm #106013
11	2	Bearing Block	Linkage Arm	102089	28	3	Linkage Arm
12	1	Gas Train Support Angle Assembly	Gasket Burner to Burner Tube	24179	29	1	Gasket Burner to Burner Tube
13	1	Bottom End Cover Assembly	Switch Contactor DFSH-C0	157477	30	1	Switch Contactor DFSH-C0
14	1	Fireye & Scanner Tube Assembly	Air Switch Tubing Assembly	157443	31	1	Air Switch Tubing Assembly
15	1	Transformer	Gas Tubing Assembly	157394	32	1	Gas Tubing Assembly
16	1	Air Whirl Assembly	Mounting Flange Gasket	54671	33	1	Mounting Flange Gasket
17	1	Motor, 5 HP 3450 RPM 3 Ph. Fr. 213 61603	Linkage Drive Shaft	157428	34	1	Linkage Drive Shaft
			Drive Shaft Collar	61603	35	1	Drive Shaft Collar

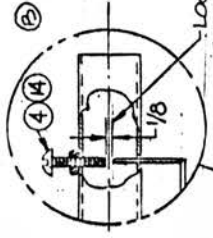


**PARTS LIST FOR NOZZLE PIPE ASSEMBLY
FOR FV-40 LIGHT OIL & LIGHT OIL-GAS
COMBINATION (FULL MODULATION) BURNER (159380)**

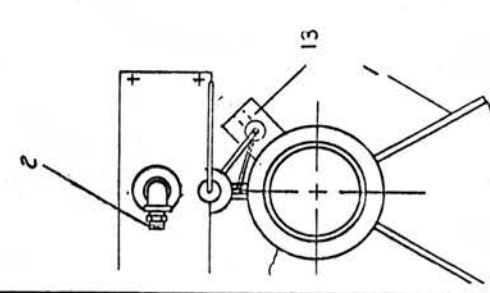
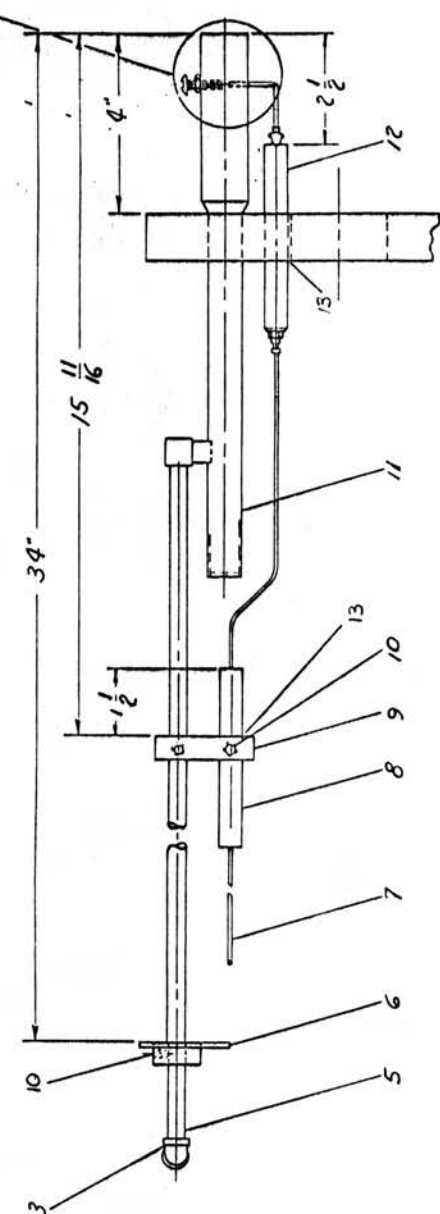
BOILER H.P.	NO.	NOZZLE SIZE
100	106253	1 - 12.0 Gal. 80°
	106280	2 - 8.3 Gal. 80°
125	106253	3 - 12.0 Gal. 80°
150	106708	1 - 15.3 Gal. 60°
	106708	2 - 13.8 Gal. 60°

Ref. No. No. Rqd.	Name	Part No. (See Chart)
1	Nozzle, F80 Type BPS	157238
2	Nipple 1/4" IPS x 35-1/2" Lg. Black	138429
3	Nozzle Cluster	52435
4	1/4" IPS 90° Elbow	63223
5	Reducing Elbow 1/4" x 1/8" x 90°	107244
6	Pipe Plug - Slotted Brass 1/8" IPS	51400
7	Connector, Straight 1/4" MPT x 1/4" SAE	160940
8	Nipple, Black 1/8" IPS x 37" Lg.	159379
9	Nipple 6 Pipe Support	138431
10	Nozzle Pipe Plate	50718
11	Close Nipple 1/4"	52496
12	Connector 1/4" IPS x 1/4" SAE 90°	





LOCATE SPARK GAP IN CENTER OF TUBE



QTY	ITEM	DESCRIPTION	CD	UN
1	5A174	*10-24N ₂ HEXNUT	0	
2	27282	CLAMP SLEEVE	70	
1	157313	ELECTRODE ASSY	0	
1	11643	IGNITOR ASSY	0	
3	50609	1/4-20 x 1/4 LG SET SCR	70	
1	15955B	SCANNER SPRT	0	
1	58696	PORCELAIN	70	
1	157315	BUSS BAR (FORM AT ASSY)	30	
1	157316	A TOP END COVER ASSY	0	
1	147643	1/4 IPS X 27 LG NIPPLE	0	
1	109A08	*10-24N ₂ x 1 1/4 STL 5TL, R.H., MACHINE SCREW	0	
1	51754	1/4 x 3/8 x 90° RED. ELL.	70	
1	51750	3/8 x 1/2 SAE CONN.	70	
1	157318	NOZZLE PIPE & GAS IGNITOR SPRAY	0	

UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN INCHES.

FABRICATING TOLERANCES: ANGLES: F. 1/32

TECHNOLOGIES INC. 800 N. MILLE ROAD, TOMPKINS, PA. 17088 U.S.A.

IGNITOR PIPE ASSY FOR OIL & GAS OIL FV-40 BURNER

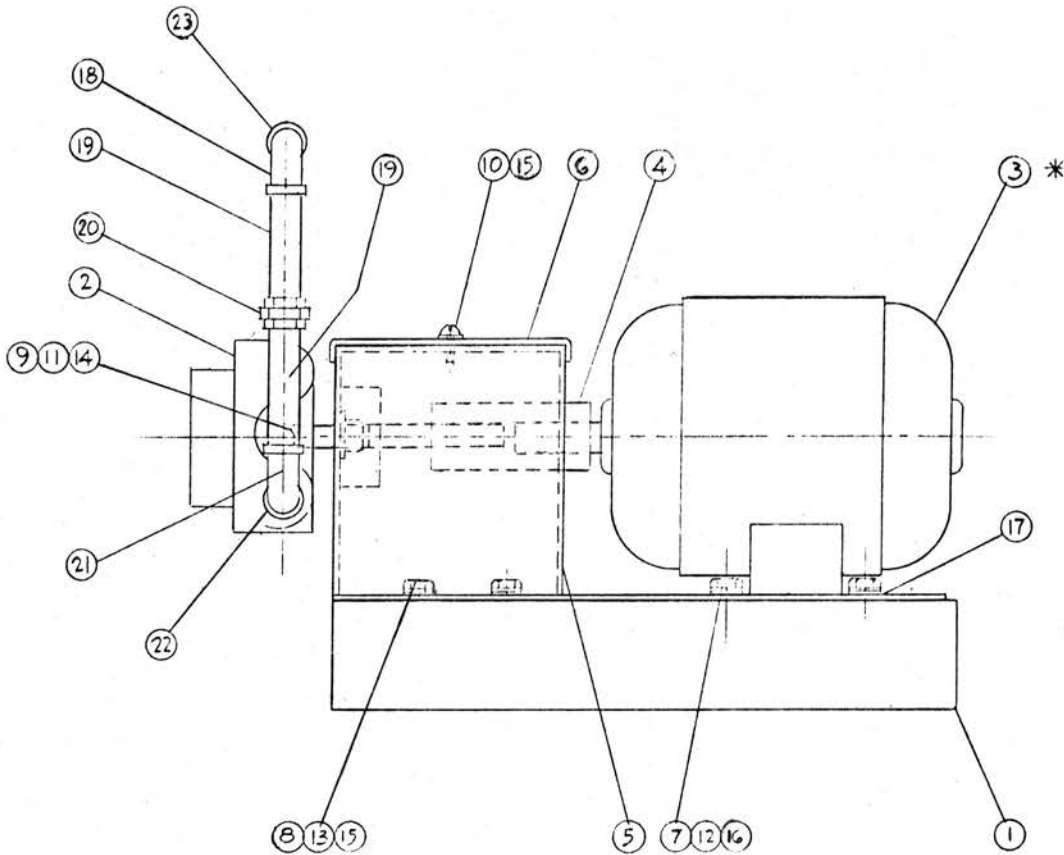
DATE: 1-16-74 BY: N-157312

THIS DRAWING AND ALL DATA HEREON ARE THE PROPERTY OF DONLEE TECHNOLOGIES INC. AND ARE TO BE KEPT IN CONFIDENTIALITY. DONLEE TECHNOLOGIES INC. IS NOT RESPONSIBLE FOR THE USE OF THIS DRAWING IN ANY MANNER OTHER THAN THAT AUTHORIZED BY DONLEE TECHNOLOGIES INC. THIS DRAWING IS THE PROPERTY OF DONLEE TECHNOLOGIES INC. AND IS TO BE KEPT IN CONFIDENTIALITY. DONLEE TECHNOLOGIES INC. IS NOT RESPONSIBLE FOR THE USE OF THIS DRAWING IN ANY MANNER OTHER THAN THAT AUTHORIZED BY DONLEE TECHNOLOGIES INC.

REV	DESCRIPTION	DATE	BY
0	1-11-74 N-157312 WAS DWN 157314	3/10/74	AL
1	REVISED PIC ADD BLOW-UP DETAILS	5/15/74	CB
2	NOTE ADD ITS # 4 & 7	11/3/70	JOH

REV	DESCRIPTION	DATE	BY
0	1-11-74 N-157312 WAS DWN 157314	3/10/74	AL
1	REVISED PIC ADD BLOW-UP DETAILS	5/15/74	CB
2	NOTE ADD ITS # 4 & 7	11/3/70	JOH

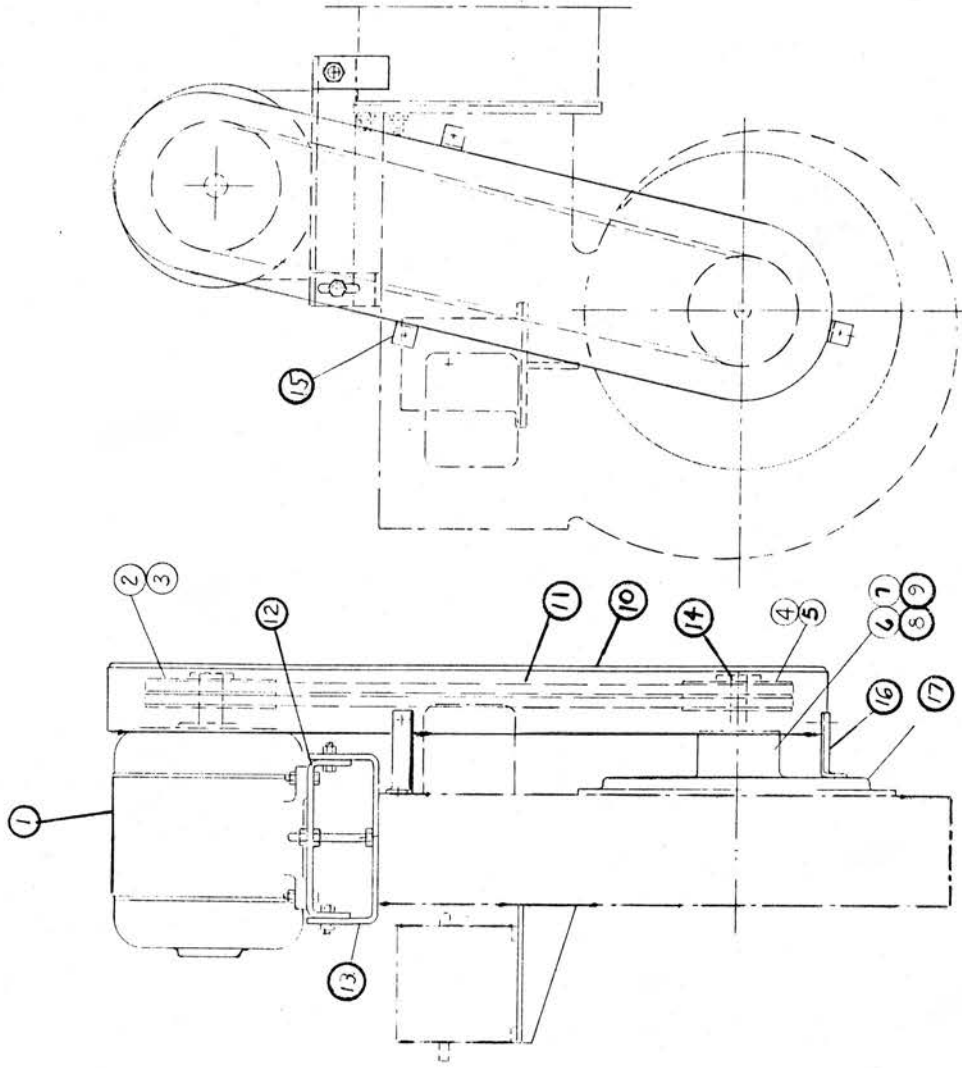
OIL PUMP SET ASSEMBLY (162449)



<u>REF. NO.</u>	<u>NAME</u>	<u>NO. RQD</u>	<u>PART NO.</u>
1	Base	1	167496
2	Pump, Sundstrand H6KA-100	1	51398
*3	Motor, 1/2 HP 3500 RPM 115/1/60	1	106026
4	Coupling, Flexible	1	50060
5	Coupling, Guard Assembly	1	167492
6	Coupling, Guard Cover	1	167495
7	Cap Screw, 5/16" x 1" Lg. Hex Hd	4	105119
8	Cap Screw, 1/4" x 1" Lg. Hex Hd	4	67994
9	Bolt, Hex Hd 3/8" x 1-1/4" Lg.	2	50228
10	Machine Screw 1/4" - 20 x 1/2" Lg.	2	105173
11	Hex Nut 3/8"	2	50023
12	Flat Washer 5/16"	4	105150
13	Flat Washer 1/4"	4	105149
14	Lock Washer 3/8"	2	105158
15	Lock Washer 1/4"	6	105157
16	Lock Washer 5/16"	4	53699
17	Motor Shim	2	170810
18	Elbow, 3/8" IPS	1	51935
19	Nipple, 3/8" IPS x 6" Lg.	2	52516
20	Union 3/8" IPS	2	69819
21	Elbow, Reducing 3/8" x 1/4" IPS	1	51754
22	Nipple, Close 1/4" IPS	1	50718
23	Nipple, Close 3/8" IPS	1	50799

* For 50 HZ applications, Subst. Motor P/N 105788

MOTOR & BLOWER ARRANGEMENT FV-40 BELT DRIVE (159568)



Ref. No.	No.	Name	Part No.
1	1	Motor 5 H.P., 50/60 Cy. 3600 RPM Fr. 182T 230/460	104207
2	1	Sheave 5.8 P.D., 2A Gr. Gates 7808-209	56935
3	1	Bushing 1-1/8" Bore Gates 7815-13	61982
4	1	Sheave 4.8 P.D., 2A Gr. Gates 7808-205	61020
5	1	Bushing 3/4" Bore Gates 7815-7	61978
6	1	Rear Oil Retainer	8348
7	1	Front Oil Retainer	8347
8	1	Front Bearing MRC 305 MFF	21070
9	1	Rear Bearing MRC 306 MFF	21071
10	1	Belt Guard Assem}	159569
11	2	Belts 1/4" Sect. - A66	64964
12	1	Mounting Plate - Motor	159570
13	1	Adjusting Bracket - Motor	110342
14	1	Blower Shaft	110350
15	2	Bracket - Belt Guard	159573
16	1	Bracket - Belt Guard	159574
17	1	Bearing Plate	110349

BELT DRIVE BURNER ARRANGEMENTS

FV-40 Oil	159773
FV-40 Oil - Full Modulation	159774
FV-40 Gas (Under 5,000,000 B.T.U.)	159775
FV-40 Gas (Over 5,000,000 B.T.U.)	159776
FV-40 Gas - Oil (Under 5,000,000 B.T.U.)	159777
FV-40 Gas - Oil (Over 5,000,000 B.T.U.)	159778
FV-40 Gas - Oil Full Modulation (Under 5,000,000 B.T.U.)	159779
FV-40 Gas - Oil Full Modulation (Over 5,000,000 B.T.U.)	159780